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International Conference on Information Resources Management (CONF-IRM)

5-2008

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Ramanjit Singh
University of Manchester, ramanjit.singh@postgrad.manchester.ac.uk

Trevor Wood-Harper
University of Manchester, t.wood-harper@manchester.ac.uk

Bouchaib Bahli
Donau-Universität Krems, bouchaib.bahli@donau-uni.ac.at

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Ramanjit Singh
University of Manchester
ramanjit.singh@postgrad.manchester.ac.uk

Trevor Wood-Harper
University of Manchester
t.wood-harper@manchester.ac.uk

Bouchaib Bahli
Donau-Universität Krems
Concordia University
bouchaib.bahli@donau-uni.ac.at

Abstract

The socio-technical theory is concerned with human well-being; it is democratic, humanistic and provides both freedom and knowledge to those who are part of it. Balanced scorecard is an approach that assesses whether the organization is meeting its objectives in terms of vision and strategy. It measures four perspectives: financial, customer, internal business processes and innovation & learning. Although the balanced scorecard has proven to be fruitful in the for-profit organizations of the past, most non-profit organizations had difficulty applying the balanced scorecard. The original configuration of balanced scorecard placed financial goals on the top of the hierarchy and since maximizing shareholder wealth is not the main objective for most non-profit organizations, it was not widely applied by these organizations. As non-profit organizations commonly operate on humanistic welfare paradigm and well-being of the society, the ideas of socio-technical work design may receive a greater acceptance in these organizations than in for-profit organizations. Hence, a socio-technical balanced scorecard for the non-profit organizations will be developed with an emphasis on employee perspective. More specifically, a public university wide assessment will be proposed in this paper.

Keyword

Socio-technical theory, organizational change, balanced scorecard, non-profit organization, socio-technical balance-scorecard.

1. Introduction

Socio-technical theory is half a century old. It was founded by group of researchers, therapists, and consultants at the London Tavistock Clinic to assist soldiers for regaining their mental stability and health after the war. The group at Tavistock Clinic believed that treatment ideas used for healings the soldiers could be applied for enriching jobs. In line with this thinking, the Tavistock institute was developed by this group in 1946. The Tavistock institute wanted to merge disciplines such as psychology and social science in a way that enabled the organization to design jobs that lead to higher job satisfaction. Since the group originated from a therapeutic background, members were interested in “results” and also “theories”. This thinking guided them to an approach that was based on action research, which resulted in the remedial changes based upon analysis and theory. The

members of the Tavistock institute believed that no theory could be established without practice and no practice could thrive without theoretical influence. Upon the initial success in Britain, the socio-technical drive was internationalized in 1972, with the creation of the Council for the Quality of Working life. This group compromised of academics from the University of Oslo, University of Pennsylvania, York University, Centre for Continuing Education in Canberra, and the University of Michigan. Together, this group had significant influence on the development of the socio-technical theory (Checkland & Holwell, 2004; Mumford, 2003, 2006).

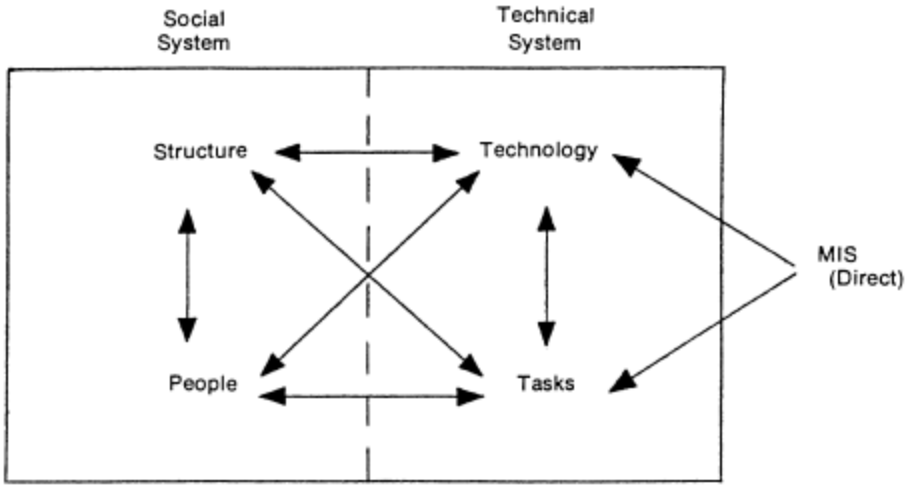
In the 1970s, socio-technical theory was widely applied for designing jobs. However, many firms came under pressure during the 1980s to cut costs and under these circumstances socio-technical ideas were seen as expensive and risky to implement. During 1990s socio-technical design principles continued to struggle, as there was little room for investment in the human capital. The focus was mainly on lean production methods and business process reengineering flourished. A widely accepted methodology which gained corporate awareness during the 1990s is the balanced scorecard (Kaplan & Norton, 1992). The balanced scorecard provides an assessment on the firm's financial position, customer satisfaction, internal processes, and research & development. In other words, the balanced scorecard provides the manager with information about problems areas and invokes change to correct inconsistencies in the organization. Although the balanced scorecard has been fruitful for the for-profit organizations, its use in the non-profit sector has been rare. The original configuration of balanced scorecard placed the financial goals on the top of the hierarchy but as the non-profit organizations generally function for the well-being of the society and maximizing shareholder wealth is not the main objective, it was not widely applied by these organizations. Hence, a socio-technical balanced scorecard with an emphasis on employee perspective will be developed and proposed for assessing a public university.

2. Socio-technical Theory in Organizations

The socio-technical theory suggests ideas that could facilitate the design of jobs in a way that improve human work lives. So, jobs were enriched using flexible work methods, empowerment strategies and new technologies. Even though many organizations applied the socio-technical theory in the past, people still have jobs that are routine, closely monitored and provide little room for personal development (Checkland & Holwell, 2004; Checkland & Scholes, 1990). Two questions could be asked. First, why did socio-technical interest decrease in the 1980s and 1990s? Second, can the socio-technical theory provide guidance for meeting challenges of the 21st century? Today, a complex economic environment surrounds the organizations and it has a significant impact on its performance and the way it functions in the society. In order to realize production efficiency, clear specification to goals need to be followed and control structures need to be in place. Even though the visionary group at Tavistock institute believed in participative goal setting, many organizations pay no attention to employee participation when designing jobs. Hence, when jobs are designed, social risks and consequences of work are often overlooked by the management (Mumford, 2003, 2006).

According to the socio-technical theory, jobs should be designed in a way that fosters creativity, flexibility, and intellectual growth. In the past, practitioners at Tavistock institute have strived to reach two objectives: humanization of work and creation of democratic work policies. Similarly, the goal of socio-technical theory is the joint

optimization of the social and technical elements of the organization (Mumford, 2003, 2006). Social elements of the organization are composed of work-related aspects such as task variety, task identity, and autonomy that provide job satisfaction and motivation to the organizational employees (Mumford, 2006). In addition to the work-related aspects, structural elements such as adequate workload, co-worker support, management support, career advancement opportunities and realistic performance measures and reward structures may also increase the overall job satisfaction (Seo, Ko, & Price, 2004). Technical elements, on the other hand, are concerned with the work processes, tasks, and technology needed to transform inputs into desired outputs. Also, technical elements focus on the identification of possible deviations in the transformation process and aim to control them (Wood-Harper, Fok, & Kumar, 1987). Although the two elements described above differ considerably, their interplay and harmony is essential for the organization's success in the business (Kling, 1999; Kling & Iacono, 2001).



The Interacting Variable Classes within a Work System (Bostrom & Heinen, 1977, p. 25)

Perhaps the most fundamental innovation in the socio-technical thinking occurred in 1976 by Albert Cherns with the development of socio-technical work design principles. As seen in (Mumford, 2003), the socio-technical design principles can be described as follows.

Principle 1. **Compatibility**: Objectives must be compatible with the process of design. This implies that, if the goal is to establish democratic work arrangements (DWAs) then democratic processes must be used to form these DWAs.

Principle 2. **Minimal Critical Specification**: Employees should be given clear work specifications but leaving them to determine how to attain these work objectives.

Principle 3. **The Socio-technical Criterion**: Deviations from standards should be monitored closely in case where they cannot be eliminated. Inconsistencies of this kind must be resolved by the team that is being affected and not by the supervisors.

Principle 4. **The Multifunctionality Principle**: Group require redundancy of functions in order to be responsive and adaptable to the changes in the environment.

Principle 5. **Boundary Location**: Boundaries should be defined to assist the knowledge and experience sharing within the organization. Boundaries differentiate work activities of a group to another and all group members need to have multiple skill-set and be able to perform one another's work tasks.

Principle 6. **Information**: In most organizations, information about operations is usually accessible by the upper management. However, it should rather first go to the work group whose productivity is being monitored.

Principle 7. **Support Congruence**: Social support systems must be designed to facilitate social behaviour. If workers are to work together, management must also show supportive behaviour.

Principle 8. **Design and Human Values**: Quality of working requires following elements:

- Demanding job.
- Where learning occurs.
- Involves decision-making.
- Embedded with social support mechanism
- Possibility of relating work to social life.
- Opportunity to advance and excel in the job.

Principle 9. **Incompletion**: Emergent and continual design process, leading to an iterative process of changes in environment, demanding new work structures and objectives.

Furthermore, Pasmore (1985) has put forward a positive evaluation of socio-technical theory. He recommends that work systems need to be viewed as a group of activities facilitating the whole and not as a group of self-containing jobs. In addition, power sharing is important for increasing efficiency and democracy at workplace. Team members need multiple skill-set and should be able to carry out one another's work. Lastly, jobs should be designed in a way, which facilitate variety, learning, and knowledge sharing on the job. Mumford (2006) simplified these socio-technical principles and suggested that job variety, higher learning prospects, scope for decision-making, training, good supervision, recognition, and bright career prospects are important for enriching jobs. Job satisfaction may be one of the important factors of the socio-technical theory. Job satisfaction can be defined as match between the job expectations workers bring to the work and the requirements of the work as defined by the organizations. According to Mumford's framework, this can be measured under five work dimensions (Mumford & Weir, 1979).

Dimension 1: **The Knowledge Fit**: The extent to which the employee's job permits the development of skills and knowledge.

Dimension 2: **The Psychological Fit**: The extent to which the employee's job permits discretion in achieving personal goals for achievement, appreciation, development, position in the society, etc.

Dimension 3: **The Task-Structure Fit**: The extent to which the employee's job matches employee's need for task variety, task identity, and autonomy, recognition and performance assessments.

Dimension 4: **The Efficiency Fit**: The extent to which the job provides an opportunity of financial rewards and a realistic and considerate appraisal programme.

Dimension 5: **The Ethical Fit**: The extent to which the vision and mission of employer is compatible with those of the employee.

The socio-technical theory has been widely used in the organizations during the 1970s. The following discussion describes the experiences of the participating countries in more detail (Mumford, 2003).

- Norway: The Norwegian Industrial Democracy Programme was based on socio-technical design principles. It was adopted by most of the industrial firms in the country during 1970s.

- Sweden: By 1973, 500 to 1000 work improvement projects were based on the socio-technical design principles.

- Denmark: In 1970, an agreement between the Danish Employers Confederation and the Danish Federation of Trade Unions was reached. This agreement was based on principles of socio-technical theory.

- France: In 1970s, France also adopted the socio-technical design principles and subsequently became interested in "humanization of work".

- Italy: Trade union agreements between Fiat and Olivetti workers were reached on the basis of socio-technical principles.

- Germany: Humanization of work (based on socio-technical principles) initiative was introduced by the Federal Ministries of Labour and of Science and Technology in May 1974.

- Netherlands: Philips (electronics firm) was the leading socio-technical design firm in the country in the 1960s and 1970s.

- UK: Two action research projects at Tavistock Institute tested and developed the socio-technical design principles in 1949. In 1965, large scale socio-technical project was initiated at Shell UK. Upon the successful completion of this project, Shell plants in Austria, Holland, and Canada also adopted the socio-technical design principles.

- USA: During the 1960s and 1970s, the United Automobile Workers Union negotiated contracts with General Motors, Ford and Chrysler. This was performed on the basis of socio-technical theory.

- India: Prof. Nitish De, an academic in India, deployed socio-technical design principles at various Indian firms during 1960s.

It is believed that socio-technical ideas were important for two reasons during the1960s and 1970s. First, manufacturing industry was growing and firms were forced to introduce better working conditions in order to retain workers that they had. Second, increase in the

number of service firms in the industry contributed to the change in work methods as workers required job variety in production process (Mumford, 2006). Approaches that work well at one time may not be so flourishing at another since both business culture and business climate can change. This change was apparent during the 1980s where many firms came under pressure to cut costs and save on the labour expenditures. Machines moved into offices to facilitate routine work processes and lean production methods became the norm in the industry (Moldaschl & Weber, 1998). During 1990s socio-technical design principles continued to struggle as there was little room for investment in human capital. The focus was mainly on lean production methods and business process reengineering flourished. Nevertheless, there were a small number of firms in the United Kingdom, USA, Europe, and Australia that recognized the importance of participative decision-making, multi-skilled workforce and self-regulating autonomous work groups (Mumford, 2006).

3. Multi-objective, Multi-criteria Theories in Organizations

The socio-technical approach's main goal is to design jobs that increase job satisfaction and work motivation for the employees. High on the list are work methods that lead to job variety, work freedom, participative decision-making, training, supervision, recognition, and career advancement opportunities (Mumford 2003). Even though socio-technical principles enrich jobs which benefit the overall profitability of the firm, researchers and practitioners have failed to find any positive correlation between socio-technical work design and firm's profitability (Landauer & NetLibrary, 1995; Lucas Henry, 1999; Strassmann, 1990). Just more recently, researchers have found evidence that support the claim: socio-technical work design increases the productivity of the firm (Azoff, Jones, Rodger, & Butler, 2004; Boresson C., 2005; Butler, 2004). Nevertheless, these findings are not without arguments and controversy. Neither accounting nor economics discipline acknowledges the fact that social elements of a firm have positive effect on the financial well-being. Traditionally, accounting has recognized elements such as cost, revenue and other complex measures such as "goodwill" but incorporation of intellectual assets and there worth have been poor in the organizations. Although traditional economics accounted for the corporate social responsibility, modern managerial economics show little concern toward the welfare of the employees. Even the most widely cited book: The Foundations of Corporate Success does not pay much regard to the socio-technical job design (Land, 2000). Moreover, (Porter, 1985) five-force analysis does not assess employee behaviour and attitude in the firm and how it impacts firm's performance in the industry . Business process reengineering (BPR) that consists of traditional and well-accepted ideas of accounting and evaluation do not recognize the need for policies and reward systems that increase job satisfaction. The furthest most authors go is to indicate the "resistance of employees" for accepting organizational change. Little research or discussion is taking place on why there is resistance. Business schools commonly introduce the topic of how to satisfy employees through various gain sharing and profit sharing programmes but little attention is given to social factors that contribute to the overall job satisfaction of the workers (Land, 2000; Mumford, 2003). To obtain a wider recognition, socio-technical approach has to show its worth and importance, in terms, relevancy to the managerial paradigm. The socio-technical evaluation consists of two stages. First, the assesor need to show that the socio-technical approach is likely to increase shareholder wealth and that it poseses less risk and more certainty than other approaches. Second, the assesor needs to provide evidence that socio-techincal iniatiatives lead to financial gains for the organization.

Furthermore, technical evaluation is widely accepted in most organizations.Techincal evaluation is commonly performed using a set of rules that make it possible to measure performance on a single scale, the financial. The socio-technical method takes into account a multiple criteria to measure firm's performance. Hence, an assessment of second order impact of social changes may be required. For example, if changes introduced by socio-technical design increases job satisfaction, the likely secondary impacts might be reduced absenteeism, healthly workforce, and hopefully increased productivity. There are few assessment methods that are based on multi-objective, multi-criteria (MOMC) principle. Information economics (Parker & Benson, 1988) and the balanced scorecard (Kaplan & Norton, 1992) are two deviations of the MOMC concept. Information economics realizes that gains from technology based change include factors which traditional cost/benefit calculations cannot handle. It is so because, there are range of intangible benefits such as improved response time for handling customer complaints or ubiqutous information retreival for on site decision-making. According to information economics, gains are split into two categories, the technical and the social, which are assessed independently. However, no explicit guidelines are provided for assesing gains, risks and costs relating to the social aspects of work. Information economics may well be modified to incorporate a thorough evaluation based on the social aspects of work. Even though information economics has proved useful in assessing the value of information systems (IS), it is not widely used in the organizations. Perhaps its emphasis on IS assessment rather than as a organizational wide tool for assessing job design may have suppressed its acceptance by the management (Land, 2000).

A widely accepted methodology which has gained corporate attention is the balanced scorecard (Nair, 2004). Since the balanced scorecard is concerned with the financial well-being of the firm, it may be an appropriate method for assessing the socio-technical worth of IS in the organizations. Although (Martinsons, Davison, & Tse, 1999) tailored the balanced scorecard for evaluating the worth of decision support systems, the originators never include the "social" in the scorecard. The balanced scorecard was mainly developed to measure organization's customer satisfaction, financial standing, internal business processes, and ambition to learn and grow. (Land, 2000) described balanced scorecard as: dials and indicators in an cockpit of an aeroplane. In order to navigate the aeroplane, pilot need information on aspects such as fuel, altitude, air speed, bearing, and final destination. Likewise, the complexity of running an organization requires performance information from several areas concurrently. The balanced scorecard enables the manager to answer four important questions (Kaplan & Norton, 1992).

- How do customers view us? (Customer perspective)
- What must we improve and excel at? (Internal perspective)
- Can we keep on improving and creating value? (Innovation and learning perspective)
- How do the shareholders perceive us? (Financial perspective)

In order to analyze the customer perspective, the balanced scorecard requires the manager to split the mission statement into exact measures that really matter to the customer. Customer concerns commonly fall into four categories; they are quality, response time, customer service, and cost. Hence, to put the balanced scorecard at work, the manager need to define goals for quality, response time, customer service, and cost and then transform these goals into precise measurable objectives. Customer-related measurement criteria are important, but they must be transformed into specific measures of what the firm must do

internally to satisfy its customers. Hence, the manager needs to identify critical success factors and improve on the operations that really matters to the customer. Factors that have the best impact on customer satisfaction include response time on customer query, product/service quality, worker skills, and productivity. To attain these goals on customer satisfaction, the manager must identify improvement areas that are influenced by workers' actions. Internal business process measures factors that a firm considers essential for its competitive success. Competition in the market requires the firm to introduce new products/services and continue to improve its offering to stay competitive in the industry. A firm' measurement factor to learn, improve, and innovate is directly tied to the firm's ability to introduce new products and services, add more value for the customer, and improve internal operations, target new markets, develop foreign operations and in so doing increase shareholder wealth. Financial performance factors specify whether firm's strategy, performance, and implementation are improving firms bottom-line. Case flow statements, income statement, increase in assets and decrease in liabilities, and growth in share price commonly measure financial per.

4. The Socio-technical Balanced Scorecard

The four perspectives of the balanced scorecard are inter-linked since satisfied customers and production efficiencies leads to financial well-being of the organization. In order to develop a balanced scorecard, the assessor needs to sketch a table with a list of goals and their respective measures. Thus, under customer perspective a goal might be to "reduce service time for repairs". The appropriate measure might be average time to make a repair. Based on the measurement data, the evaluator can perform standard deviation analysis to identify delays in service and which factors might have contributed to the delay. The selection of goals is an important process and stakeholder input is essential in identifying high priority goals and ranking them according to their inherent risk and organizational mission and strategy.

The critics of balanced scorecard indicate lack of many other important perspectives. For instance, one could incorporate stakeholder perspective to identify how firm is perceived by its suppliers, investors, and society at large. Nevertheless, it may be subtle to measure goals that firm cannot fully control, reducing the original significance and viability of the balanced scorecard (Martinsons et al., 1999). It is believed that the balanced scorecard can be extended to include employee (socio-technical) perspective. With the incorporation of employee perspective, the organization could identify how the employees may perceive it. Since today's employee require autonomy, freedom, safe working conditions, it is essential that appropriate measures are defined to assess employee satisfaction. Highly motivated and satisfied workforce is often linked with excellent customer service, in that, if enthusiastic staff approaches the customers, it is likely that they will return or do business again with the firm. Also, it is believed that motivated workforce is more likely to learn and improve internal operations and make the organization more competitive in the industry. Hence, employee perspective is linked with firm's major functions and it is important that the organization focus on improving its employees' work environment (Horton, Davenport, & Wood-Harper, 2005; Land, 2000). Moreover, the socio-technical balanced scorecard can be used to define goals that are important from both managerial as well as the employees social welfare. With the incorporation of employee perspective, it is believed that goals such as higher job satisfaction, stress reduction; increase in participative decision-making may materialize. Assessment measures could include first order measures such as changes in work satisfaction and secondary measures such as decline in

absenteeism and improvement in behaviour and physical health may also be fruitful. The process of defining goals and measures in the employee perspective can be regarded as a socio-technical one. The principles of socio-technical theory may be valuable in this process. That is, they can help define goals that intend to improve employee job satisfaction (Kaplan & Norton, 2001).

Although the balanced scorecard has been fruitful in the for-profit organizations, most non-profit organizations had difficulty applying the balanced scorecard. The original configuration of balanced scorecard placed financial goals on the top of the hierarchy but since maximizing shareholder wealth is not the main objective, it was not widely applied by these organizations. The socio-technical balanced scorecard may be useful in assessing for-profit organization's mission and vision strategy, but its application in a non-profit organization can be valuable. As non-profit organizations commonly operate on humanistic welfare paradigm and well-being of the society, the ideas of socio-technical job design may receive greater acceptance in these organizations. Universities can be defined as private or public institutions. Private universities are generally for-profit and public universities are of non-profit nature (Wikipedia, 2007). The University of Manchester is a non-profit institution and it is mainly funded by the council grants (government), academic fees (students), research grants (donors), and other operating income (accommodation) (The University of Manchester, 2004). Moreover, in a for-profit university, students pay entirely for the education that they receive. But in a public university, government and donors predominantly provide financial resources for supplementing students' tuition fees. Here one could ask, who the customer is-the student or government or donor agencies. Rather making a choice, public universities may consider government, donor agencies and students as a customer when applying the socio-technical balanced scorecard. An extensive framework for accessing a public university is developed next for a complete illustration of the socio-technical balance scorecard.

Employee Perspective	
Goals	**Measures**
Increase in Academics' Productivity	- Number of course given per year. - Number of MSc/PhD students supervised per year. - Response time to a work-related email - Number of journal and conference papers published per year.
Reduction in Staff Absenteeism	- Number of sick days per year
Increase in Academics/Staff's Work Satisfaction	- Number of new skills acquired per year. - Amount of freedom in conducting work. - Amount of participation in decision-making. - Amount of balance between work and social life. - Number of reward/ promotions received per year.

Customer Perspective	
Goals	**Measures**
World Class University-Student Perspective	- Number of faculties in the university. - Number of applications per year. - Number of national and foreign students enrolled per year. - Amount ICT support for the students.
World Class University-Government/Donor Perspective	- Number of degree certificates awarded per year. - Number of research awards per year. - Amount of technology support for the faculty and staff.

Internal Business Perspective	
Goals	**Measures**
Highly Knowledgeable Academics	- Number of academics with a PhD degree
Online Course Administration	- Number of online support tools available for course management (WebCT/First Class).
Broad Selection of Literature	- Number of libraries available at the university.
Secure Internet/Intranet Access	- Number of intrusions per year.
Efficient ICT Infrastructure and Support	- Number of Computer Clusters in the University. - Number of wireless hot spots in the campus. - Number of helpdesk support staff available.

Innovation and Learning Perspective	
Goals	**Measures**
Increase in Financial Support.	- Number of students receiving scholarships.
Industry Relevance	- Number of new courses developed per year.
Increase in e-learning initiatives.	- Number of online courses introduced per year.

Financial Perspective	
Goals	**Measures**
Increase in University Graduates	- Number of university degrees provided per year
Increase in Donor Funds	- Amount of funding obtained from outside bodies per year

Table 1: The Socio-technical Balanced Scorecard for a Public University Wide Assessment (The University of Manchester, 2004)

5. Conclusion

Socio-technical theory has been used in the organizations to design jobs that provide work satisfaction and motivation to the organizational employees. Although socio-technical theory has been fruitful in many organizations, it has not been applied widely due to the need for cost savings in the past. The balanced scorecard is a methodology that has been used extensively in the organizations. The balanced scorecard enables the organization to assess its strategy and whether it's meeting its financial goals. The balanced scorecard has been beneficial in the for-profit organizations; its use in the non-profit organizations has been poor. The original configuration of balanced scorecard placed financial goals on the top of the hierarchy and since maximizing shareholder wealth is not a main objective for most non-profit organizations, it was not widely applied by these organizations. Thus, the socio-technical balanced scorecard was developed to include the employee perspective.

With the incorporation of employee perspective, work-related factors that have a negative impact on the employees work performance may be identified and enable the organization to design jobs that promote employee task variety, discretion, participation in the decision-making process, training, realistic performance measures, and rewarding pay structures. Next, a framework for accessing a public university was proposed for an illustration of the socio-technical balance scorecard. The employee perspective was included to assess the academics/staff's productivity, absenteeism, and job satisfaction whereas customer perspective takes into consideration multiple measures that include student/government/donor viewpoints and goals. The internal business perspective relates to the goals that measure a university's academic as well as administrative processes including IT infrastructure. The innovation and learning perspective, on the contrary, is concerned with financial support for the students and the number of new courses developed including e-learning courses per year. Lastly, the financial perspective relates to the increase in university graduates and funding obtained from the government and donor bodies each year.

Acknowledgments

This research is partially funded by the Fonds Québécois de la Recherche sur la Société et la Culture (FQRSC), Québéc, Canada.

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